WHAT IS CLAIMED IS:

1. A data transmission apparatus for generating a transmission signal corresponding to data to be processed based on a predetermined communication protocol, and transmitting/receiving the transmission signal, the apparatus comprising:

a processing unit for processing transmission/reception data based on the communication protocol;

a transmitting/receiving unit for generating a transmission signal based on the transmission data processed by the processing unit and outputting the resultant signal, and generating reception data based on a transmission signal output from other data transmission apparatus and outputting the resultant data to the processing unit;

transmitting/receiving unit initialization means for initializing the transmitting/receiving unit so that the transmitting/receiving unit is operable to perform transmission/reception with other transmitting/receiving units of other data transmission apparatuses; and

processing unit initialization means for initializing the processing unit so that the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the transmitting/receiving unit after the transmitting/receiving unit initialization means

initializes the transmitting/receiving unit.

2. The data transmission apparatus according to claim 1, wherein the transmitting/receiving unit initialization means initializes the transmitting/receiving unit by establishing clock synchronization between the transmitting/receiving unit and other transmitting/receiving units of other data transmission apparatuses.

3. The data transmission apparatus according to claim 2, wherein

the transmitting/receiving unit initialization means includes clock synchronization establishment notification means for notifying the processing unit initialization means of establishment of clock synchronization when the clock synchronization is established, and

the processing unit initialization means starts initialization, in response to clock synchronization establishment notification made by the clock synchronization establishment notification means, by which the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the transmitting/receiving unit.

4. The data transmission apparatus according to claim 3,

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wherein

if no clock synchronization establishment notification is made by the clock synchronization establishment notification means within a predetermined time, the processing unit

5   initialization means starts initialization so that the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the transmitting/receiving unit,

the processing unit initialization means further

10   includes communication anomaly detection means for detecting anomalies of data communication during the started initialization, and

when the communication anomaly detection means detects the anomalies, the transmitting/receiving unit initialization

15   means re-performs initialization by which clock synchronization is established between the transmitting/receiving unit and other transmitting/receiving units of other data transmission apparatuses.

20   5. The data transmission apparatus according to claim 1, wherein

the transmitting/receiving unit generates the transmission signal by mapping the transmission data to any of a plurality of signal levels, and

25   the transmitting/receiving unit initialization means

performs initialization by causing the transmitting/receiving unit:

      to transmit an initialization signal for identifying the signal levels to other data transmission apparatuses; and

5   to receive an initialization signal transmitted from other data transmission apparatus, and set evaluation levels for identifying a signal level of the transmission signal using the initialization signal.

10   6.   The data transmission apparatus according to claim 5, wherein

      the transmitting/receiving unit initialization means includes evaluation level setting completion notification means for notifying the processing unit initialization means of

15   completion of setting of evaluation levels when the evaluation levels are set, and

      the processing unit initialization means starts initialization, in response to notification of a completion of evaluation level setting made by the evaluation level setting

20   completion notification means, by which the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the transmitting/receiving unit.

25   7.   The data transmission apparatus according to claim 6,

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wherein

if no notification of a completion of evaluation level setting is made by the evaluation level setting completion notification means within a predetermined time, the processing unit initialization means starts initialization so that the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the transmitting/receiving unit,

the processing unit initialization means further includes communication anomaly detection means for detecting anomalies of data communication during the started initialization, and

when the communication anomaly detection means detects the anomalies, the transmitting/receiving unit initialization means re-performs initialization for setting the evaluation levels.

8.   The data transmission apparatus according to claim 1, wherein the communication protocol used by the processing unit is defined by MOST (Media Oriented Systems Transport).

9.   The data transmission apparatus according to claim 1 further comprising a radiator for outputting a reference frequency, wherein

the processing unit and the transmitting/receiving unit

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separately include a phase lock loop for performing a process by

establishing clock synchronization, and

each phase lock loop included in the processing unit

and the transmitting/receiving unit uses the reference frequency

5   output from the radiator.

10.   A data transmission system including a plurality

of data transmission apparatuses connected in a ring topology via

a transmission path, by which the data transmission apparatuses

10   perform unidirectional communication with each other, wherein

each data transmission apparatus includes:

a   processing   unit   for   processing

transmission/reception   data   based   on   a   predetermined

communication protocol;

15   a transmitting/receiving unit for generating a

transmission signal based on the transmission data processed by

the processing unit and outputting the resultant signal to other

data transmission apparatus connected to a next stage, and

generating reception data based on a transmission signal output

20   from other data transmission apparatus connected to a previous

stage and outputting the resultant data to the processing unit;

transmitting/receiving unit initialization means

for initializing the transmitting/receiving unit so that the

transmitting/receiving   unit   is   operable   to   perform

25   transmission/reception with other transmitting/receiving units

of other data transmission apparatuses; and

processing unit initialization means for initializing the processing unit so that the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the transmitting/receiving unit after the transmitting/receiving unit initialization means initializes the transmitting/receiving unit.

11. The data transmission system according to claim 10, wherein the transmitting/receiving unit initialization means initializes the transmitting/receiving unit by establishing clock synchronization between the transmitting/receiving unit and other transmitting/receiving units of other data transmission apparatuses.

12. The data transmission system according to claim 11, wherein

the transmitting/receiving unit initialization means includes clock synchronization establishment notification means for notifying the processing unit initialization means of establishment of clock synchronization when the clock synchronization is established, and

the processing unit initialization means starts initialization, in response to clock synchronization

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establishment notification made by the clock synchronization establishment notification means, by which the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the

5   transmitting/receiving unit.

13. The data transmission system according to claim 12, wherein

if no clock synchronization establishment notification
10   is made by the clock synchronization establishment notification means within a predetermined time, the processing unit initialization means starts initialization so that the processing unit is operable to perform data communication with other processing units of other data transmission apparatuses via the
15   transmitting/receiving unit,

the processing unit initialization means further includes communication anomaly detection means for detecting anomalies of data communication during the started initialization, and

20   when the communication anomaly detection means detects the anomalies, the transmitting/receiving unit initialization means re-performs initialization by which clock synchronization is established between the transmitting/receiving unit and other transmitting/receiving units of other data transmission apparatuses.
25   apparatuses.

14. The data transmission system according to claim 10, wherein

the transmitting/receiving unit generates the

5 transmission signal by mapping the transmission data to any of

a plurality of signal levels, and

the transmitting/receiving unit initialization means

performs initialization by causing the transmitting/receiving

unit:

10 to transmit an initialization signal for identifying

the signal levels to other data transmission apparatuses connected

to a next stage; and

to receive an initialization signal transmitted from

other data transmission apparatus connected to a previous stage,

15 and set evaluation levels for identifying a signal level of the

transmission signal using the initialization signal.

15. The data transmission system according to claim 14, wherein

20 the transmitting/receiving unit initialization means

includes evaluation level setting completion notification means

for notifying the processing unit initialization means of

completion of setting of evaluation levels when the evaluation

levels are set, and

25 the processing unit initialization means starts

initialization, in response to notification of a completion of evaluation level setting made by the evaluation level setting completion notification means by which the processing unit is operable to perform data communication with other processing units

5   of   other   data   transmission   apparatuses   via   the transmitting/receiving unit.

16.   The data transmission system according to claim 15, wherein

10   if no notification of a completion of evaluation level setting is made by the evaluation level setting completion notification means within a predetermined time, the processing unit initialization means starts initialization so that the processing unit is operable to perform data communication with

15   other processing units of other data transmission apparatuses via the transmitting/receiving unit,

the processing unit initialization means further includes communication anomaly detection means for detecting anomalies of data communication during the started initialization,

20   and

when the communication anomaly detection means detects the anomalies, the transmitting/receiving unit initialization means re-performs initialization for setting the evaluation levels.

17. The data transmission system according to claim 10, wherein the communication protocol used by the processing unit is defined by MOST (Media Oriented Systems Transport).

18. The data transmission system according to claim 10, wherein

each data transmission apparatus further includes a radiator for outputting a reference frequency,

the processing unit and the transmitting/receiving unit separately include a phase lock loop for performing a process by establishing clock synchronization, and

each phase lock loop included in the processing unit and the transmitting/receiving unit uses the reference frequency output from the radiator.

19. An initialization method for initializing a data transmission apparatus generating a transmission signal corresponding to data to be processed based on a predetermined communication protocol, and transmitting/receiving the transmission signal to/from other data transmission apparatus, wherein

a physical layer, which generates a transmission signal corresponding to transmission data processed based on the communication protocol and transmits the resultant signal, and generates reception data based on a transmission signal output

from other data transmission apparatus, and other physical layers

of other data transmission apparatuses are initialized so as to

be operable to transmit/receive the transmission signal, and

after initialization of the physical layers, a link layer,

5 which processes the transmission data and the reception data based

on the communication protocol, and other link layers of other data

transmission apparatuses are initialized so as to be operable to

perform data communication via the physical layers.

10 20. The initialization method according to claim 19,

wherein initialization of the physical layer is performed by

establishing clock synchronization between the physical layer and

other physical layers of other data transmission apparatuses.

15 21. The initialization method according to claim 20,

wherein

when the clock synchronization is established in

initialization of the physical layer, establishment of the clock

synchronization is notified, and

20 in response to notification of establishment of the clock

synchronization, initialization is started so that the link layer

and other link layers of other data transmission apparatuses are

operable to perform data communication via the physical layer.

25 22. The initialization method according to claim 21,

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wherein

if no notification of establishment of the clock synchronization is made within a predetermined time, initialization is started so that the link layer and other link layers of other data transmission apparatuses are operable to perform data communication via the physical layer, and

when anomalies of data communication are detected during the started initialization, initialization for establishing clock synchronization between the physical layer and other physical layers of other data transmission apparatuses is re-performed.

23. The initialization method according to claim 19, wherein

the transmission signal is generated from the transmission data which is mapped to any of a plurality of signal levels by the physical layer, and

initialization of the physical layer is performed by:

transmitting an initialization signal for identifying the signal levels, from the physical layer to other data transmission apparatuses; and

setting evaluation levels for identifying a signal level of the transmission signal using an initialization signal after the physical layer receives the initialization signal transmitted from other data transmission apparatus.

24.   The initialization method according to claim 23,
wherein

in   the   initialization   of   the   physical   layer,
notification of a completion of evaluation level setting is made
5   when the evaluation levels are set, and

in response to notification of a completion of evaluation
level setting, initialization by which the link layer and other
link layers of other data transmission apparatuses are operable
to perform data communication via the physical layer is started.
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25.   The initialization method according to claim 24,
wherein

if no notification of a completion of evaluation level
setting is made within a predetermined time, initialization is
15   started so that the link layer and other link layers of other data
transmission   apparatuses   are   operable   to   perform   data
communication via the physical layer, and

when anomalies of data communication are detected during
the   started   initialization,   initialization   for   setting   the
20   evaluation levels is re-performed.

26.   The initialization method according to claim 19,
wherein the communication protocol is defined by MOST (Media
Oriented Systems Transport).